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AUTHOR Gennari, Patricia A.; And Others
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ABSTRACT

The Data-Based Staff Development Program is an integral feature of the Adaptive Learning Environments Model (ALEM), an educational program developed to provide basic skills learning experiences that are adaptive to the individual learning needs of students. The Data-Based Staff Development Program was designed to assist school personnel responsible for implementing the ALEM in systematically incorporating relevant data on the degree of program implementation and students' learning progress in analyses of their staff development needs. The goal is to provide a self-monitoring tool that helps school personnel become increasingly more independent in establishing and maintaining a high degree of ALEM implementation. During the 1980-81 school year, a pilot investigation of the effectiveness of this program in improving classroom implementation of the ALEM was conducted in ten elementary schools. Data were obtained through the use of three measures: (1) instruments measuring degree of program implementation; (2) school district staff development plans; and (3) monthly training logs kept by the schools' education specialists. The data were analyzed to investigate the relationship between staff development plans and program implementation needs as suggested in the degree of implementation scores for individual teachers. Preliminary evidence from the study supports the effectiveness of the program; more detailed studies in the future will be needed to confirm this finding. Tables illustrate the critical factors used in analyses and the results of the study. (JD)

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The Data-Based Staff Development Program: Design, Implementation, and Effects

Patricia A. Gennari, Nicholas Tomich, and Mary Zajac

Learning Research and Development Center
University of Pittsburgh

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Abstract

This paper describes the rationale and design of the Data-Based Staff Development Program, aimed at training school staff to implement an innovative program for providing school learning experiences that are adaptive to individual student differences. The paper also summarizes a pilot study of the effectiveness of the Data-Based Staff Development Program in improving implementation of the innovative program in a variety of school settings. Data from the study provide preliminary evidence of the effectiveness of using a data-based approach to staff development, as well as suggest future lines of work in this area.

The Data-Based Staff Development Program: Design, Implementation, and Effects

Patricia A. Gennari, Nicholas Tomich, and Mary Zajac

Learning Research and Development Center
University of Pittsburgh

The need to provide school staff with the educational opportunities required for continuing professional development has received increased attention in recent years, for at least two reasons. First, many school improvement efforts that require new or upgraded skills on the part of staff members have been undertaken. Second, as the result of legislative mandates such as those calling for desegregated schools and the mainstreaming of exceptional children in regular classrooms, schools are faced with the task of retraining staff members to take on the challenge of providing quality educational experiences for an increasingly diverse population.

While the need for staff development programs is recognized among both researchers and practitioners, systematic development of such programs as an integral part of improvement efforts is scattered, at best. It is in this context that work on the Data-Based Staff Development Program was initiated.

The purposes of this paper are (a) to describe the Data-Based Staff Development Program, designed to train school staff to implement the programmatic and personnel role changes required to effectively establish and maintain an innovative program aimed at providing school learning experiences that are adaptive to student differences; and (b) to present, and discuss the implications of, findings from a study conducted to investigate the effectiveness of the Data-Based Staff

Development Program in improving classroom implementation of the innovative program. Specifically, the paper includes three sections. The first consists of an overview of the Data-Based Staff Development Program. This overview is followed by a description of a pilot study aimed at investigating the program's effectiveness. A summary of study findings and a discussion of their implications for future work are presented in the final section of the paper.

Overview of the Data-Based Staff Development Program

In this overview, the rationale for the Data-Based Staff Development Program is discussed first. The design of the program is then described in some detail.

Rationale

The Data-Based Staff Development Program was developed based on two major premises. The first is that the establishment and maintenance of innovative school programs require not only detailed specification and understanding of the programs' design and operating features, but also the conduct of staff development activities to promote understanding of the programs and to support their day-to-day implementation in classrooms (Wang, 1980b). Second, the staff development programs that are designed must have certain characteristics. As an example, staff development programs must be adaptive; that is, they must focus on the needs of individual staff members. Teachers (and other professional and paraprofessional staff) learn in different ways. More importantly, they come to the classroom at different stages, some more advanced than others. Staff development programs must be tailored to the identified

strengths and weaknesses of individuals, not of the group at large. In addition to being adaptive, staff development programs must focus on the day-to-day implementation problems that teachers face and must be continuous in nature, assisting teachers every step of the way. In-service programs that occur every two to three months are inadequate. Teachers need frequent contact and continuous support in their efforts to solve both short- and long-range problems.

These essential characteristics of effective staff development programs are not unique. They have been identified in a number of research and development efforts in the area of staff development (e.g., Cruickshank, Lorish, & Thompson, 1979; Griffin, 1979; McLaughlin & March, 1979; McNergney, 1980; Miller & Wolf, 1979; Perry, 1980; Zigarmi, Amory, & Zigarmi, 1979).

The Data-Based Staff Development Program is an integral feature of the Adaptive Learning Environments Model (ALEM), an educational program developed at the Learning Research and Development Center (LRDC) of the University of Pittsburgh to provide school learning experiences that are adaptive to the individual learning needs of students (Wang, 1980a, 1980b). The Data-Based Staff Development Program is designed to assist those school personnel responsible for implementing the ALEM in systematically incorporating relevant data on the degree of program implementation and students' learning progress in analyses of their staff development needs. The goal is to provide a self-monitoring tool that helps school personnel become increasingly more independent in establishing and maintaining a high degree of program implementation. Among the expected outcomes of the Data-Based Staff Development Program are increased self-sufficiency in schools' monitoring of their program

implementation and, subsequently, institutionalization of educational innovations, like the ALEM, at local sites. In order to provide background information on the Data-Based Staff Development Program, the ALEM is described briefly below.

The overall goal of the ALEM is to create school learning environments in which each student can acquire basic academic skills while becoming increasingly more confident in his or her ability to learn and to cope with the social and physical surroundings of the classroom (Wang, 1980a). This goal is accomplished by combining the advantages of both a highly structured programming component, which includes a built-in, diagnostic-prescriptive procedure for the development of skills in basic academic subject areas (e.g., reading and math), and a more open-ended, exploratory learning component, which includes a variety of problem-solving and student-initiated activities for social and personal development. Major expected outcomes of the ALEM for students are effective use of school time, motivation to spend the time required to master the basic academic skills, and development of increased competence in independently managing learning and the school learning environment. At the same time, teachers functioning under the ALEM are expected to be able to spend increased amounts of time providing instruction rather than managing students.

The underlying assumption of the ALEM's design is that the implementation of innovative educational programs requires some fundamental changes in the nature and structure of schools' curricular materials and instructional procedures, their organizational and staff support systems, their teaching and learning processes, and the roles of teachers and students. Because of the ALEM's unique program design and

the fundamental changes in teacher and student roles required to effectively establish and maintain a high degree of program implementation, the development of a staff development program that provides school personnel with appropriate technical assistance has been a major R&D effort in the design and field testing of the ALEM.

Design

The ALEM's Data-Based Staff Development Program includes three major training levels, a set of measures for assessing the degree of program implementation, and systematic and adaptive staff development plans.

Training levels. The Data-Based Staff Development Program incorporates three levels of training, ranging from initial awareness training to ongoing in-service training. Figure 1 shows the levels and sequential steps of the Data-Based Staff Development Program. As outlined in Figure 1, Level I is designed to provide basic working knowledge of the curricular content and procedures incorporated in the ALEM. In Level II, more intensive training is provided in specific staff functions. Level III is a clinical training component tailored to the needs of individual staff. Training at Level III is ongoing in-service training designed to help school staff continually improve and upgrade their classroom implementation. It is primarily at the third level of the Data-Based Staff Development Program that the iterative process of assessment, feedback, planning, and training occurs (Wang, Note 1).

Insert Figure 1 about here

1. Level I: Basic training. Training at Level I is aimed at providing an overview of the ALEM and working knowledge about the implementation requirements of the various program components. The basic training level focuses on three major topic areas. They are (a) the rationale and design of the ALEM and relevant program evaluation results; (b) an overview of the various program components; and (c) the knowledge and skills required for program implementation (e.g., information on the content covered in each of the basic skills and exploratory learning areas; the procedures for diagnostic testing, prescription writing, and record keeping; the design of the classroom environment; the management and display of learning materials; and the procedures for self-scheduling). Level I staff development activities generally are scheduled as pre-implementation sessions. They are designed for all relevant administrative personnel (from central administrative staff to those at the building level), as well as for instructional and other support personnel whose duties affect the implementation of the ALEM and the provision of educational services to students in ALEM classrooms. Staff development work at the basic training level generally requires two or three days.

2. Level II: Individualized training. Staff development activities at the individualized training level are designed to provide in-depth training that is specific to each staff member's functions, based on analyses of site-specific program implementation needs. Essentially, training at this level is designed to provide differentiated staff development activities prior to program implementation. Specific training activities are designed according to an analysis of the functions to be carried out in the implementation of the ALEM and the assignment of those functions to the various district

personnel whose present responsibilities might not include the functions.

As indicated in Figure 1, individualized training is designed to be provided to four basic types of personnel: classroom teachers, classroom aides, education specialists, and family specialists. The amount of time required for Level II training varies from site to site (depending on individual schools' unique constraints and their staff's understanding of their roles and functions), and a detailed plan for each site's program implementation is developed. Individualized training sessions, which last two or three days, generally are scheduled immediately after Level I basic training sessions. Experience has shown that the total staff development work at Levels I and II can be completed in a week-long workshop prior to the opening of school.

3. Level III: In-service training. Level III, the in-service training component of the Data-Based Staff Development Program, is the culmination of an interactive process of program assessment, feedback, planning, and ongoing staff development work. Essentially, it provides the technical support required to establish and maintain a high degree of program implementation at school sites. The in-service training component is designed to be adaptive to the training needs and expertise of individual staff. As a result, the type and frequency of in-service training sessions vary for different sites and staff. They range from short meetings (during teacher preparation times) to half-day workshops.

As shown in Figure 1, there are two types of Level III training sessions: staff planning sessions and sessions for feedback and training. Staff planning sessions are designed to develop plans to accomplish selected instructional-learning objectives and to determine

topics for staff feedback and training. Staff planning is based on information from classroom observations, data on students' learning progress, and feedback from family members. Sessions for staff feedback and training are held throughout the school year. They provide opportunities to discuss critical issues related to program implementation, particularly in terms of program refinement and improvement in the degree of program implementation. Feedback and training sessions are scheduled on a regular basis, according to staff members' needs and interests. They usually take place during regular staff planning times and/or during schools' scheduled team meetings and in-service training times.

Degree of program implementation measures. A critical prerequisite for the development of a system for establishing and maintaining a high degree of implementation of an innovative educational program is the availability of information on the extent to which the program's design actually is implemented. The development of degree of implementation measures to assess the presence and absence of the ALEM's critical design features began with the identification of 12 critical dimensions of the program. These dimensions were identified through an analysis of the program's structural and action domains. The structural domain refers to those aspects of the program's design that are required to establish the conditions under which program activities can be implemented effectively. The action domain consists of those roles and behaviors of the instructional staff and students that are required for effective functioning under the ALEM. Subsequent to the identification of the critical dimensions, performance indicators for each dimension were identified (Wang, Note 2). Ninety-six performance indicators for assessing the presence and absence of the 12 critical dimensions were

identified and grouped into a battery of six degree of implementation instruments.

Two of the degree of implementation instruments are designed for observing dynamic aspects of program implementation--the Observation Checklist for Teacher Traveling Behavior and the Observation Checklist for Student Classroom Behavior. These checklists are administered during class time, while students and teachers engage in the instructional-learning process. Two instruments focus on non-dynamic observables--the Checklist for Physical Design of the Classroom and the Checklist for Classroom Records. These instruments are administered before or after regular class time, when students and teachers are not present in the classroom. The final two instruments are interview questionnaires designed to elicit comments from students and teachers on various aspects of program implementation--the Student Interview and the Teacher Interview. The Teacher Interview is administered before or after class time, and the Student Interview is administered during class time. (Information on the validation of the degree of implementation instruments is found in Strom and Wang [Note 3]).

The degree of implementation instruments are used by school personnel on a regular basis to collect implementation information for staff development purposes (i.e., the in-service training component of the Data-Based Staff Development Program). School personnel are encouraged to use the instruments, as needed, to monitor the degree of program implementation in their classrooms. The data also are collected at least three times during the school year (usually in October, February, and April) for program evaluation purposes. It generally takes about two hours per classroom to complete (administer) all six degree of implementation instruments.

A computer program was developed to analyze and report degree of implementation data in a form that can be used by site personnel to design and monitor site-specific staff development plans aimed at improving program implementation (Schmidhammer, Note 4). Figure 2 is an example of a computer printout of an analysis of the degree of implementation data.

Insert Figure 2 about here

As shown in the figure, the data are analyzed in four different levels or units: site, school, grade level, and class (teacher). The mean scores for the critical dimensions of the ALEM are reported in 12 separate columns. The names and acronyms for the dimensions, as they are listed in the left-hand corner of the printout, are "arranging space and facilities" (AS&F), "creating and maintaining instructional materials" (CMIM), "establishing and communicating rules and procedures" (ECRP), "managing aides" (MA), "testing" (TEST), "record keeping" (RCRD), "monitoring and diagnosing" (M&D), "prescribing" (PRES), "traveling" (TRAV), "instructing" (INST), "motivating" (MOTI), and "student planning" (SP). The number in parentheses under the acronym for each dimension indicates the total number of items (performance indicators) included in the monitoring instruments to assess the degree of implementation of that dimension. For example, in "creating and maintaining instructional materials" (CMIM), shown in the second column of Figure 2, 11 performance indicators are included in the instruments to assess the degree to which the CMIM dimension is implemented as prescribed by the ALEM's design. The printout also includes information

on each teacher's degree of implementation with respect to each of the 12 critical dimensions, as well as mean percentages of the degree of implementation for each grade within a particular school, for a given school, for specific grade levels across an entire school district, and for the entire district.

The criterion for "good" or high degree of implementation of a critical dimension was set at 85%. That is, when 85% or more of the items in a given dimension were observed to be present, the degree of implementation of that program dimension was considered to be "high." When 50% to 84% of the items for a given dimension were present, implementation of that program dimension was considered to be "average." If less than 50% of the items in a given dimension were present, implementation of that dimension was considered to be "low." Using these criteria, Figure 2 shows, for example, that all of the classes in School A, except Grade 2, achieved "high" implementation of the "instructing" (INST) dimension. Grade 2 had an "average" degree of implementation score (79% of the items present).

The overall degree of implementation across a variety of schools for an extended period of time can provide evidence of the "implementability" of the ALEM and its critical dimensions. In addition, the degree of implementation of particular dimensions can be analyzed for individual teachers and used in estimating their training needs and developing specific staff development plans. Similarly, grade, school, and site averages can be used to identify staff development needs by grade levels, schools, and particular school districts. Analyses of the changes in degree of implementation from one assessment period to the next can provide information to teachers about

their individual implementation progress, as well as information that can serve as the data base for evaluating the effectiveness of schools' implementation and staff development efforts.

Adaptive staff development plans. The Data-Based Staff Development Program is operationalized in school sites through site-specific staff development plans. A comprehensive staff development plan is developed for each site at the beginning of every school year. The plan is based on a variety of information, including degree of implementation and student learning progress data from the spring of the previous school year (for new teachers and/or new implementation sites, from the beginning of the school year); each site's identified staff development needs; and the major categories of activities proposed to meet those needs during the year.

Specifically, staff development plans include (a) a description of the specific training tasks/objectives for items in the degree of implementation measures that consistently show scores below the 85% criterion level across a significant number of teachers (and/or for a particular teacher); (b) the dates the training is to be completed; (c) the person(s) responsible for training; (d) the type of activity to be conducted; (e) the expected outcomes; and (f) evidence of effective service as it relates to successful completion of the training. An excerpt from the staff development plan for School District B is shown in Figure 3.

Insert Figure 3 about here

Staff development plans are reviewed periodically by site personnel (e.g., education specialists and/or principals) to determine the appropriateness of the planned training objectives, as well as to monitor progress toward achievement of the objectives. Monthly training logs, kept by education specialists, are a major source of information for reviewing each site's progress and updating its staff development plans. The logs include descriptions of activities such as classroom observations, conferences between teachers and education specialists, and in-service training workshops. Figure 4 shows a sample training log.

Insert Figure 4 about here

In addition to periodic reviews, during which staff development plans for each site are updated and revised if needed, formal reviews of the plans are scheduled following each of three data collection periods (generally scheduled in October, February, and April). Data on degree of implementation and student learning progress are collected by site personnel during the three specified periods and are analyzed for both formative and summative evaluation purposes.

The Study: An Investigation of the Effects of the Data-Based Staff Development Program

During the 1980-81 school year, a pilot investigation of the effectiveness of the Data-Based Staff Development Program in improving classroom implementation of the ALEM was conducted. The study is part of an ongoing program of research designed to provide information for the systematic improvement of the ALEM and its implementation in a

variety of school settings. The setting in which the study was conducted, the measures used, and the results of the study are discussed in this section.

Setting

The setting for the study consisted of 10 school sites, including a total of 156 classes (kindergarten through fourth grade). The school districts are located in communities with varying ethno-cultural, socioeconomic, and geographic characteristics. Included are inner-city suburban, rural, and Appalachian communities. Each of the sites in the study participates in either the National Follow Through Program (a nationwide compensatory education program of the U.S. Department of Education) or a mainstreaming program for gifted and mildly handicapped students sponsored by the U.S. Office of Special Education. Table 1 provides a summary description of the participating school districts.

Insert Table 1 about here

Measures

Data for the study were obtained through the use of three sets of measures: the degree of implementation monitoring instruments, the school districts' staff development plans, and the monthly training logs kept by the sites' education specialists.

Degree of implementation instruments. The six instruments described earlier were administered during October, February, and April of the 1980-81 school year in each of the classrooms participating in the study. The instruments were used to systematically determine the

presence or absence of the 12 critical dimensions of the ALEM in the classrooms. The resulting data were analyzed and reported in the format illustrated in Figure 2. Of particular interest in this study were the changes in the degree of implementation between data collection points.

Staff development plans. A staff development plan was designed for each of the participating sites at the beginning of the 1980-81 school year. As shown in Figure 3, staff development plans include information on prescribed training tasks/objectives, dates of training, names of persons responsible, type of activity to be conducted, and expected outcomes in each of the critical dimensions identified as requiring improved implementation. These dimensions were identified through analysis of the sites' degree of implementation data for Fall, 1980 and other related data, such as students' learning progress in the ALEM's curriculum and the results of standardized achievement tests. As mentioned previously, staff development plans are updated throughout the school year according to sites' changing training needs. Information on changes in staff development plans was analyzed in terms of specific critical dimensions requiring improved implementation and the nature of the prescribed training activities.

Monthly training logs. Data on the actual implementation of training activities prescribed in the sites' staff development plans were obtained from the monthly training logs prepared by education specialists. Logs were completed for each of the classrooms participating in the study. As shown in Figure 4, information is categorized according to (a) classroom observations (generally done by the education specialists) of student-teacher behaviors associated with the ALEM's critical dimensions, (b) strategies suggested by education

specialists for improving the implementation of particular critical dimensions, (c) expected outcomes of the suggested training strategies; and (d) findings of follow-up observations.

Results

Information obtained from the three data sources described above formed the basic data set for the study. The data were analyzed to investigate the relationship between staff development plans and program implementation needs as suggested in the degree of implementation scores for individual teachers. Specifically, the data served as the basis for answering three related questions: "Did the staff development plans for each site reflect the individual staff's program implementation needs?"; "Were the sites' training activities related to the staff development plans?"; and "Did degree of implementation scores improve as the result of specific training activities?"

Consistency between staff development plans and the identified program implementation needs. To determine whether the sites' staff development plans were consistent with their identified training needs, the degree of implementation scores from October, 1980 and the overall 1980-81 staff development plans developed for each of the sites were analyzed. The training objectives listed in the staff development plan for each site were compared to the critical dimensions in which the site's degree of implementation scores fell below the 85% criterion level. The percentages of agreement between the two sets of data were calculated.

The results of the analysis are reported in Table 2. As shown in the table, the staff development plans excluded 98% of the dimensions with scores at or above the 85% criterion level (an indication that no special training was needed), while 86% of the dimensions with scores below the criterion level (an indication that training was needed) were included in the staff development plans. In other words, there was 86% agreement between the specific performance indicators for which the degree of implementation data suggested the need for training and the training activities/objectives included in the staff development plans. Similarly, 98% agreement was achieved between the degree of implementation data that indicated no training was needed and the critical dimensions excluded from the staff development plans. The overall data suggest that the sites' staff development plans were highly consistent with the training needs identified in the Fall, 1980 degree of implementation data.

Insert Table 2 about here

Further investigations of the exclusion from the staff development plans of 14% of the critical dimensions with scores below the criterion level revealed that these dimensions were included in the plans designed for individual teachers. Since only a few of the sites' teachers were involved, training in the dimensions was excluded from the overall staff development plans.

Consistency between identified staff development needs and training activities. To investigate the extent to which the prescribed training activities actually were conducted to meet the specific staff

development needs (training objectives) identified in the staff development plans, correlation analyses were carried out between the prescribed training activities and the training activities recorded in the education specialists' monthly logs. The analyses included a detailed review of each entry in the logs. Specifically, each entry was classified by a trained observer as relating to one of the 12 critical dimensions of the ALEM. This classification was based on the relationship of the nature of the training activities listed in the logs to one (or more) of the 96 performance indicators included in the 12 critical dimensions. The result was a list, for each of the 119 teachers on whom data were available, of the number of times he/she received a training-related contact in each of the dimensions. The reliability of this process was calculated from the percentage of agreement scores for two raters. These scores consistently were above 98%.

Table 3 provides a summary of the correlations between the critical dimensions included in the staff development plans and the number of times training related to those dimensions was listed in the education specialists' monthly logs. The correlations were all positive in direction, and they ranged in magnitude from .05 ("traveling") to .59 ("arranging space and facilities"). Significant correlations were found in eight of the 12 dimensions, and an overall significant correlation was found ($r = .37$; $p < .01$).

Insert Table 3 about here

Nature and patterns of changes observed as the result of the training. To provide information related to the extent to which training based on staff development plans was effective in improving the degree of program implementation at the sites, changes in the degree of implementation data between the October and April (Fall, 1980 and Spring, 1981) data collection periods were analyzed. The results are reported in Table 4. Each site's fall and spring average percentage scores on each of the 12 critical program dimensions are summarized in the table, along with changes in the site's mean percentage scores between fall and spring of the 1980-81 school year. While there was variation in the magnitude of changes in the 10 sites' degree of implementation scores between fall and spring, positive changes were observed in all the sites in a majority of the critical dimensions. In fact, 88% of the scores on each critical dimension across all 10 sites improved or remained stable. Analysis of the overall changes in the sites' degree of implementation scores between fall and spring was statistically significant at the .01 level.

Insert Table 4 about here

An analysis was also done of the relationship between (a) the critical dimensions shown in both the fall data and the education specialists' monthly logs as not having met the criterion level, and (b) the critical dimensions shown in the spring data as not having met the criterion level. The results of this analysis across the sites showed that the mean number of critical dimensions (across the 12 critical dimensions) not meeting the 85% criterion level in October, 1980 was four. By April, 1981, the mean number of dimensions not meeting the

criterion level was reduced to two. This reduction is statistically significant ($p < .01$).

In order to assess the extent to which changes in the degree of implementation for specific critical dimensions were the result of planned staff development activities, comparisons were made of the changes in (a) the degree of implementation of the critical dimensions identified in the staff development plans as areas in which training was needed and those dimensions identified in the monthly logs as areas in which training actually took place, and (b) the critical dimensions that did not appear in the monthly logs. The results are reported in Table 5 for 138 teachers. It should be noted that although a total of 156 classes took part in the study, some classes were morning or afternoon kindergarten sessions taught by the same teacher. Thus, the total number of teachers in the study was 138 rather than 156.

Insert Table 5 about here

Table 5 shows that while the fall and spring degree of implementation data reflect a pattern of positive changes, greater increases were found in the degree of implementation scores for dimensions in which training took place than in the scores for dimensions not included in the training. Of the 1108 critical dimensions in which training took place, 80% (886) showed improvement. On the other hand, only 40% (219) of the 548 critical dimensions for which no specific training was planned showed improvement. It also should be noted that differences were found between the percentage of critical dimensions included in training but not showing any change, and

the percentage of those excluded from training and showing no change (last column of Table 5). Scores for only 14% (155) of the critical dimensions in which training took place remained stable, while 52% (285) of the scores for critical dimensions not included in the staff development plans remained stable. These results suggest that increases in program implementation scores occurred for critical program dimensions in which training took place, compared to little or no improvement for critical dimensions that needed further training but were excluded from the training plans (and for which actual training did not occur).

Summary and Discussion

Data from the pilot study provide preliminary evidence of the feasibility and effectiveness of using degree of implementation information as a data base for designing staff development programs that meet the training needs of individual teachers. In addition, the data provide suggestions for a future research and program refinement agenda.

Three major findings from the pilot study seem most relevant to increasing our understanding of, and improving current capabilities to provide, effective staff development systems. The first finding is that information derived from measures of the degree of program implementation that are based on the use of specific performance indicators for assessing the presence and absence of critical program features are useful in identifying staff development needs for improving program implementation. Second, staff development activities designed on the basis of identified needs can be effective in improving the degree of implementation of specific program dimensions. The final

major finding is that teachers tend to improve their program implementation in areas where specific staff development work is conducted. That is, training does make a difference.

Although preliminary evidence from the study seems to be quite supportive of the Data-Based Staff Development Program, at least two types of further research and development work are needed. One obvious line of future work is replication of the present study in subsequent school years, together with detailed descriptive studies of the implementation and outcomes of the program. In such studies, other sources of efficacy information should be tapped (e.g., teachers', education specialists', and other users' assessments of the usefulness of the data-based approach), and an emphasis should be placed on identifying various alternative strategies employed by teachers and other school personnel in systematically using the Data-Based Staff Development Program to maintain and refine their program implementation. Also, documentation is needed of (a) the types of training activities designed and used; (b) the decision-making rules used to prioritize training needs; (c) the time required for and spent on certain types of training activities; (d) the extent of teachers' involvement in designing specific training activities; and (e) the efficacy of various training strategies for meeting individual staff's training needs. This kind of information is likely to contribute to the knowledge base on how to make staff development more relevant to schools' program implementation needs.

The second line of research needed in this general topic area is investigations of the "generalizability" of the data-based approach to staff development. While it is important to provide evidence of the

Data-Based Staff Development Program's effectiveness in improving implementation of the ALEM's critical dimensions, use of the ALEM's degree of implementation instruments to describe the presence and absence of critical dimensions in classrooms with other programs aimed at providing school learning experiences that are adaptive to student differences should be investigated. The basic question would be, "Do the program-specific performance indicators included in the ALEM's degree of implementation measures assess a generic set of expertise required to effectively implement any adaptive education program?"

Investigations of the extent to which the ALEM's critical program features are present in classrooms that are demonstrably effective in providing adaptive instruction, but use different educational approaches and programs, would not only provide external validation of the ALEM's design, but also could prove to be very fruitful in the development of a systematic methodology for improving the implementation of programs with goals and designs similar to those of the ALEM. The long-range implications of research in this area would constitute an important contribution to the provision of much-needed technical supports to schools in their efforts to meet the challenge of providing relevant, ongoing staff development programs that meet the needs of individual teachers.

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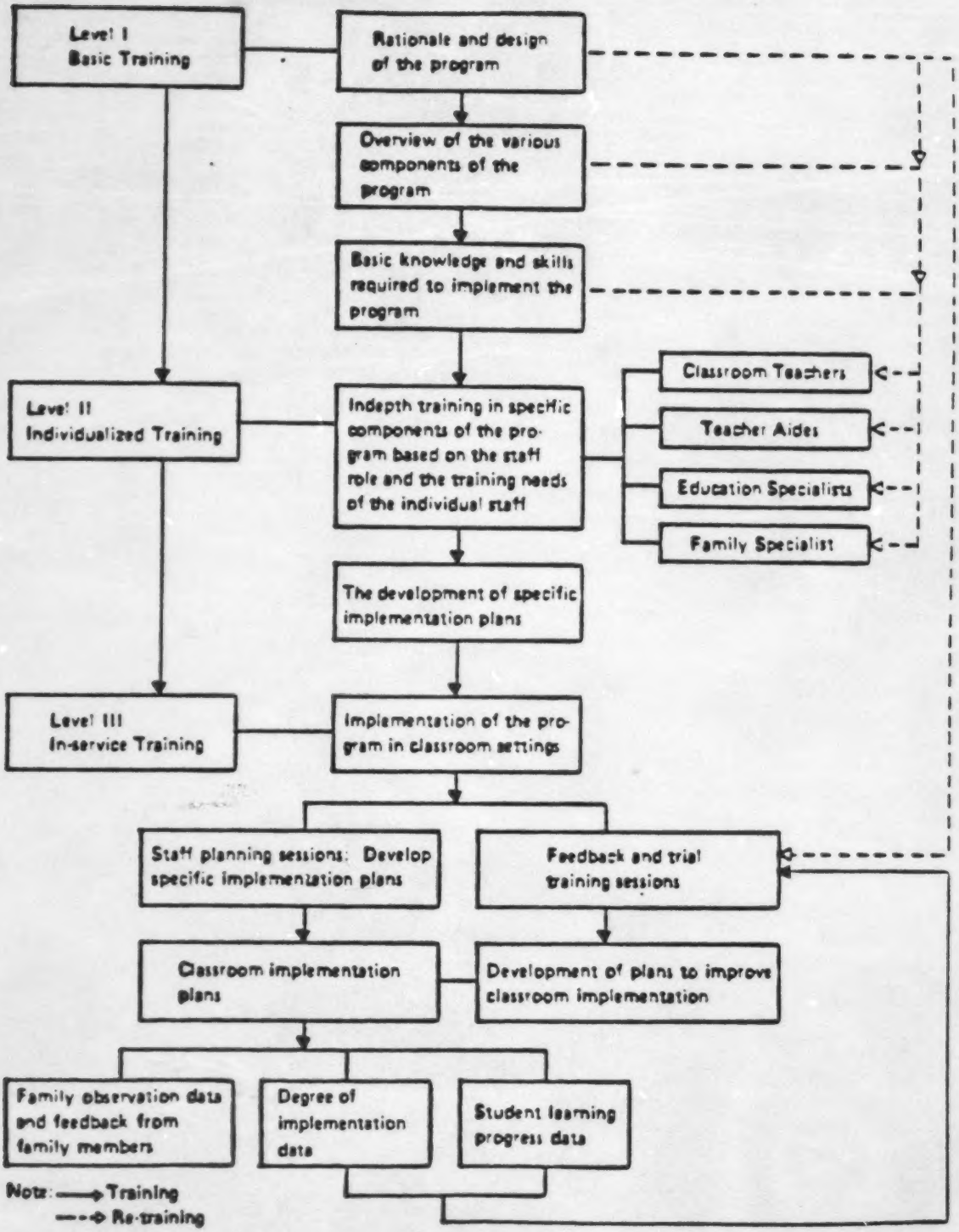
Level I
Basic Training
Rationale and design of the program
Overview of the various components of the program
Basic knowledge and skills required to implement the program
Level II
Individualized Training
Indepth training in specific components of the program based on the staff role and the training needs of the individual staff
Classroom Teachers
Teacher Aides
Education Specialists
Family Specialist
The development of specific implementation plans
Level III
In-service Training
Implementation of the program in classroom settings
Staff planning sessions: Develop specific implementation plans
Feedback and trial training sessions
Classroom implementation plans
Development of plans to improve classroom implementation
Family observation data and feedback from family members
Degree of implementation data
Student learning progress data
Note: Training
Re-training

Figure 1. The Data-Based Staff Development Program.

CRITICAL PROGRAM DIMENSION CODES

AS&F	ARRANGING SPACE & FACILITIES	M&D	MONITORING & DIAGNOSING
CMIM	CREATING & MAINTAINING INSTRUCTIONAL MATERIALS	PRES	PRESCRIBING
ECRP	ESTABLISHING & COMMUNICATING RULES & PROCEDURES	TRAV	TRAVELING
MA	MANAGING AIDES	INST	INSTRUCTING
TEST	TESTING	MOTI	MOTIVATING
RCRD	RECORD KEEPING	SP	STUDENT PLANNING

NUMBERS IN PARENTHESES INDICATE NUMBERS OF ITEMS (PERFORMANCE INDICATORS) INCLUDED IN THE DEGREE OF IMPLEMENTATION ASSESSMENT INSTRUMENTS

DISTRICT X
APRIL, 1981

		AS&F (11)	CMIM (11)	ECRP (27)	MA (3)	TEST (4)	RCRD (3)	M&D (8)	PRES (5)	TRAV (2)	INST (14)	MOTI (5)	SP (3)
School A													
Grade 1	Teacher A	100	82	93	100	75	100	100	100	100	100	100	100
Grade 2	Teacher B	100	91	93	100	100	100	88	100	100	79	100	100
Grade 3	Teacher C	100	46	85	100	50	100	100	80	100	86	60	100
Kindergarten	Teacher D	100	73	93	100	100	100	100	100	100	93	100	67
Average for School		100	73	91	100	81	100	97	95	100	89	90	92
School B													
Grade 1	Teacher E	91	73	100	100	75	100	100	100	100	100	100	100
	Teacher F	91	73	82	100	100	100	100	100	100	100	80	100
	Average	91	73	91	100	88	100	100	100	100	100	90	100
Grade 2	Teacher G	100	73	96	100	100	100	100	100	100	100	100	100
	Teacher H	91	73	96	100	100	100	100	100	100	100	100	100
	Average	95	73	96	100	100	100	100	100	100	100	100	100
Grade 3	Teacher I	91	73	78	100	100	100	100	100	100	79	80	67
	Teacher J	100	73	96	100	75	100	100	100	100	100	100	100
	Average	95	73	87	100	88	100	100	100	100	89	90	83
Kindergarten	Teacher K	100	73	100	100	75	100	100	100	100	100	100	100
	Teacher L	82	73	70	100	75	100	63	100	50	57	80	67
	Average	91	73	85	100	75	100	81	100	75	79	90	83
Average for School		93	73	90	100	88	100	95	100	94	92	93	92
School C													
Grade 1	Teacher M	100	73	85	100	100	100	100	100	100	100	100	67
Grade 2	Teacher N	91	73	93	100	100	100	100	100	100	100	100	100
Grade 3	Teacher O	100	73	96	100	100	100	100	100	100	100	100	100
Kindergarten	Teacher P	91	73	82	100	50	100	75	100	50	93	80	67
	Teacher Q	91	100	96	100	100	100	88	100	100	100	100	67
	Average	91	86	89	100	75	100	81	100	75	96	90	67
Average for School		95	78	90	100	90	100	93	100	90	99	96	80
Average for Site													
Grade Averages													
Grade 1		95	75	90	100	88	100	100	100	100	100	95	92
Grade 2		95	77	94	100	100	100	97	100	100	95	100	100
Grade 3		98	66	89	100	81	100	100	95	100	91	85	92
Kindergarten		93	78	88	100	80	100	85	100	80	89	92	73
Overall Average		95	74	90	100	87	100	95	99	94	93	93	88

Figure 2. A sample computer printout of a summary of degree of implementation data.

Site: School District B

Task Training Objective	Date	Person(s) Responsible	Type of Activity	Expected Outcome(s)	Evidence Effective Service
1. Creating and Maintaining Instructional Materials					
1.1 Conduct in-service workshop on criteria for creating exploratory activities.	March 18	LRDC Project Staff Education Specialist Principal	Workshop	Increased awareness of criteria used in constructing exploratory activities.	Teachers use criteria in designing and evaluating exploratory activities.
1.2 Teachers evaluate materials according to criteria.	March 23-27	Classroom Teachers	Evaluation	Teachers examine exploratory materials.	Materials which meet criteria are used in exploratory activities.
1.3 Teachers categorize self-constructed materials according to curricular area.	March 23-27	Classroom Teachers		Materials are categorized and ready for classroom use.	Exploratory materials are labeled according to curricular area.
1.4 Teachers list useful materials (as per criteria).	Ongoing	Classroom Teachers	Consultation	Teachers list materials already constructed and add new materials as they are constructed.	Update of list.
2. Student Planning					
2.1 Review performance indicators included in the degree of implementation measures related to student planning in weekly staff meeting.	March 11	Education Specialist School Principal	Staff Meeting	Teachers understand the rationale and need for developing supports for student planning and for developing strategies to help students plan.	Teachers are able to help students gain increased responsibility for planning.
2.2 Classroom rules and procedures are re-established and written down.	March 16	Classroom Teachers Education Specialist	Discussion and development of list	Rules and procedures are listed.	Listing of classroom rules and procedures.
2.3 Teachers review planning procedures and rules with students.	March 18	Classroom Teachers	Discussion with students	Teachers and students establish rules.	Students are able to verbalize rules.
2.4 Students are observed and interviewed by teachers and education specialist during self-scheduling.	April 14	Classroom Teachers Education Specialist	Observation	Description of each student's functioning under the Self-Schedule System.	Students communicate rules and procedures to observers verbally and nonverbally.

Figure 3. An excerpt from the 1980-81 staff development plan for School District B.

LOG

School: _____ District: _____ Grade: _____

Teacher: _____ Date: _____ Time: _____

Observed Behavior	Strategy Suggested	Expected Outcome
Math skills introduced without use of concrete aids.	*Use concrete aids to introduce new skills.*	*Concepts are introduced with manipulatives. Less time is spent teaching a skill.*
Students marked self-scheduling folder on own.	*Only aide or teacher marks self-scheduling sheet.*	*Students ask teachers (aide) to check their self-scheduling sheet when work has been completed.*
Paper/pencil tasks used in math exploratories.	*Include math activities – math bingo.*	*More hands-on tasks are included.*

Follow Up:

Figure 4. Sample monthly training log.

Table 1
Characteristics of Participating School Sites
1980-81 School Year

Site	Characteristics											
					Number of ALEM Classes at Each Grade Level							
	Community	Title I-Eligible Students In District	Population	Number of Participating Schools	K	1	1–2	2	2–3	1-2-3	3	3–4
Follow Through Sites												
School District A	Urban Industrial Community	40%	250,000	2	6	6		5			5	
School District B	Rural Native American Community	52%	8,731	1	6	6		6			5	
School District C	Semi-rural Community	20%	37,791	3	5	4		4			4	
School District D	Rural Community	22%	7,000	3	6	5		5	1		5	
School District E	Rural Appalachian Community	28%	28,762	3	4			3	2		3	
School District F	Urban/Rural Community	24%	80,000	3	9	6	1	6	1		6	
Mainstreaming Sites												
School District G	Suburban Working Class Community	11%	11,901	1	4	1	2				1	2
School District H	Large SuburbanLow SES Community	13%	33,185	1	2					3		
School District I	Large Suburban Mixed Low to Middle SES Community	5%	33,172	1	2		4					
School District J	Small-Town Suburban Low SES Community	19%	10,250	1	2		4					4
Total for 10 Sites				19	46	28	11	29	4	3	29	6
										(156 Total Classes)		

Table 2

Percentage of Agreement Between the Sites' Degree of Implementation Data and Staff Development Plans
Fall, 1980

Degree of Program Implementation	Staff Development Plans	
	Percentage of Critical Dimensions Not Included in Staff Development Plans	Percentage of Critical Dimensions Included in Staff Development Plans
Percentage of Critical Dimensions At or Above the 85% Criterion Level	98	2
Percentage of Critical Dimensions Below the 85% Criterion Level	14	86

Table 3

Summary of the Correlations Between Critical Dimensions Identified in Staff Development Plans and Training Activities Listed in Monthly Logs
1980 - 81
(N = 119 Teachers)

Critical Dimensions	r_{pb}	Significance
Arranging Space and Facilities	.59	<.05
Creating and Maintaining Instructional Materials	.48	<.05
Establishing and Communicating Rules and Procedures	.45	<.05
Managing Aides	.14	N.S.
Testing	.23	<.05
Record Keeping	.33	<.05
Monitoring and Diagnosing	.17	N.S.
Prescribing	.29	<.05
Traveling	.05	N.S.
Instructing	.13	N.S.
Motivating	.57	<.05
Student Planning	.36	<.05

Table 4

Summary of the Degree of Implementation Data
Average Percentage Scores
Fall, 1980 and Spring, 1981

Sites	Critical Dimensions																				
	Arranging Space and Facilities			Creating and Maintaining Instructional Materials			Establishing and Communicating Rules & Procedures			Managing Aides			Testing			Record Keeping		
	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change
School District A	61	98	(+37)	73	71	(−2)	69	97	(+28)	100	100	(0)	100	100	(0)	67	100	(+33)
School District B	73	94	(+21)	67	85	(+18)	82	95	(+13)	100	100	(0)	100	100	(0)	67	100	(+33)
School District C	73	96	(+23)	71	87	(+16)	70	94	(+24)	80	100	(+20)	100	100	(0)	67	100	(+33)
School District D	83	91	(+8)	73	64	(−9)	80	91	(+11)	97	93	(−4)	95	100	(+5)	90	100	(+10)
School District E	94	97	(+3)	72	85	(+13)	73	86	(+13)	98	98	(0)	100	100	(0)	94	100	(+6)
School District F	87	92	(+5)	79	89	(+10)	72	92	(+20)	97	98	(+1)	100	99	(−1)	100	100	(0)
School District G	92	95	(+3)	88	74	(−14)	89	90	(+1)	96	100	(+4)	91	87	(−4)	100	100	(0)
School District H	92	94	(+2)	71	80	(+9)	75	93	(+18)	70	100	(+30)	92	100	(+8)	100	95	(−5)
School District I	92	98	(+6)	45	97	(+52)	76	94	(+18)	100	100	(0)	100	100	(0)	100	100	(0)
School District J	92	92	(0)	74	87	(+13)	85	89	(+4)	99	99	(0)	98	100	(+2)	91	96	(+5)
Cross-Site Average	84	95	(+11)	65	82	(+11)	70	92	(+15)	94	99	(+5)	98	99	(+1)	88	99	(+11)

Table 4 (continued)

Sites	Critical Dimensions																							
	Monitoring and Diagnosing			Prescribing			Traveling			Instructing			Motivating			Student Planning			Overall Average		
	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change	Fall	Spring	Change
School District A	81	91	(+10)	80	100	(+20)	75	100	(+25)	75	75	(0)	75	100	(+25)	42	58	(+16)	75	91	(+16)
School District B	83	96	(+13)	93	100	(+7)	67	100	(+33)	74	86	(+12)	87	100	(+13)	67	78	(+11)	80	95	(+15)
School District C	63	93	(+30)	92	100	(+8)	40	100	(+60)	70	81	(+11)	64	91	(+27)	73	96	(+23)	72	95	(+23)
School District D	91	88	(−3)	98	100	(+2)	65	80	(+15)	69	76	(+7)	64	80	(+16)	60	60	(0)	80	85	(+5)
School District E	85	93	(+8)	94	99	(+5)	81	75	(−6)	86	92	(+6)	73	90	(+17)	73	88	(+15)	85	92	(+7)
School District F	97	98	(+1)	99	97	(−2)	89	93	(+4)	87	91	(+4)	78	92	(+14)	76	82	(+6)	88	94	(+6)
School District G	84	95	(+11)	100	99	(−1)	94	94	(0)	97	93	(−4)	88	93	(+5)	80	88	(+8)	92	92	(0)
School District H	91	93	(+2)	98	92	(−6)	58	95	(+37)	88	97	(+9)	81	99	(+18)	81	84	(+3)	83	94	(+11)
School District I	97	93	(−4)	95	100	(+5)	100	100	(0)	90	92	(+2)	73	98	(+25)	67	85	(+18)	86	96	(+10)
School District J	86	91	(+5)	95	96	(+1)	87	88	(+1)	82	87	(+5)	76	88	(+12)	76	90	(+14)	87	92	(+5)
Cross-Site Average	86	93	(+7)	94	98	(+4)	70	93	(+17)	82	87	(+5)	76	93	(+17)	70	81	(+11)	83	93	(+10)

Table 5
Comparison of Patterns of Changes in Degree of Implementation
Between Fall, 1980 and Spring, 1981
(N = 138 Teachers)

		Direction of Change in Degree of Implementation Score*		
	Critical Dimensions	Increase	Decrease	No Change
Number of Critical Dimensions Included in Training	1108**	886 (80%)	67 (6%)	155 (14%)
Number of Critical Dimensions Excluded from Training	548**	219 (40%)	44 (8%)	285 (52%)

Note. *$x^2 = 287.8$, $p > .01$

**Represents the sum of the critical dimensions across all 138 teachers